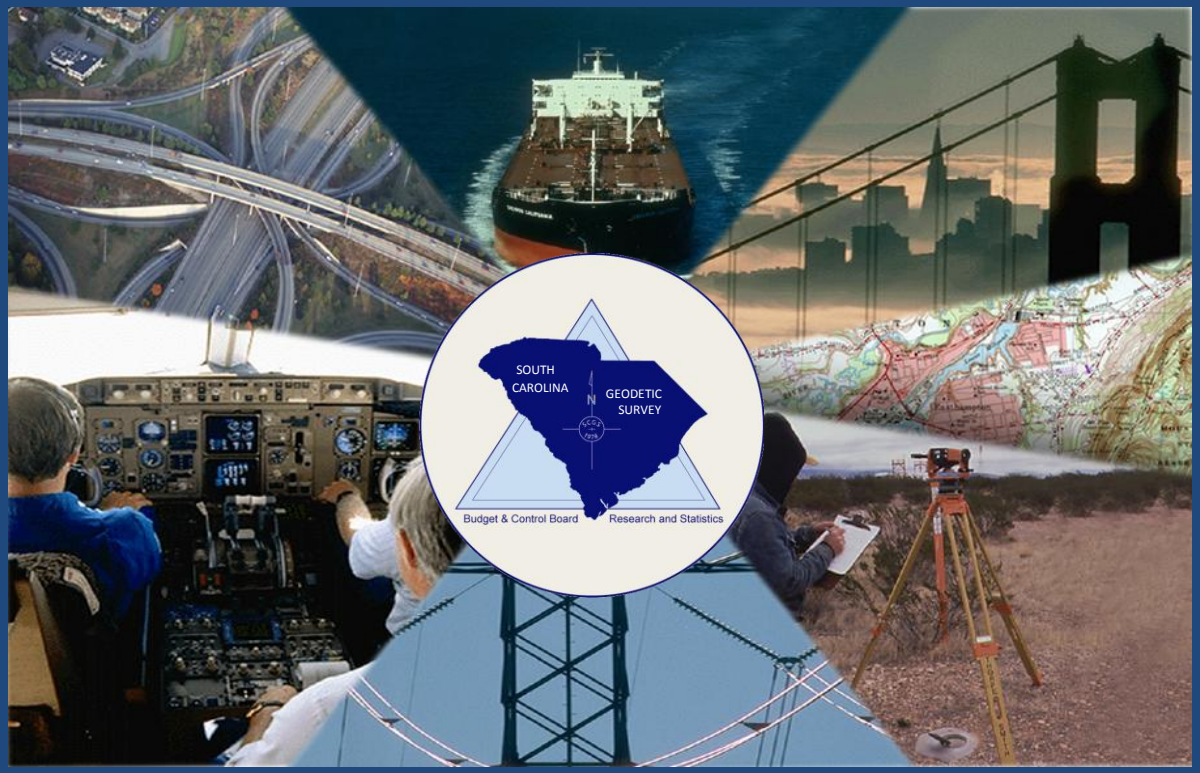
South Carolina Geodetic Survey

Dr. Lewis A. Lapine

Marine Transportation

Highway Construction



Infrastructure

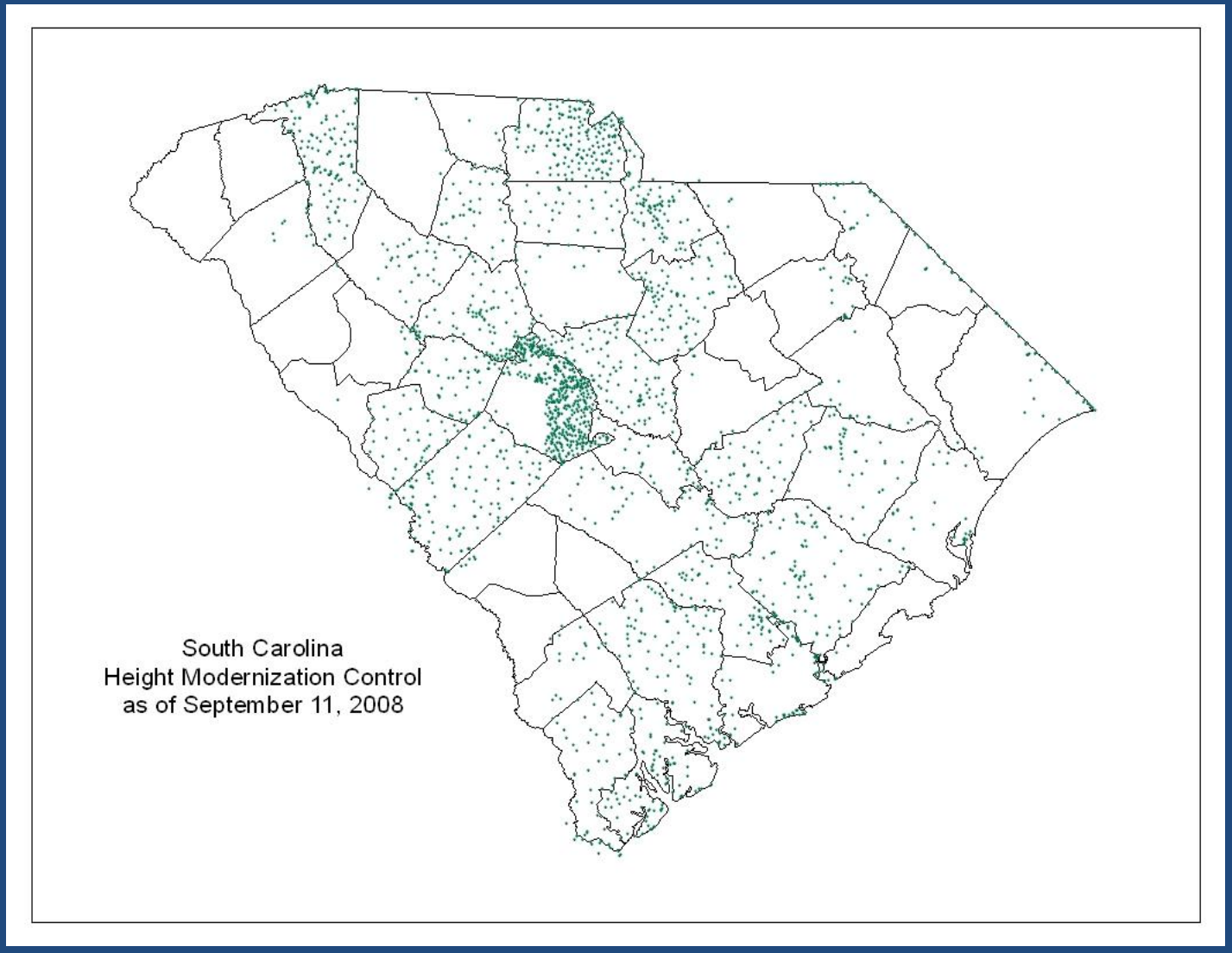
Mapping

Obstruction Charting

Surveying Engineering

Utilities

SC Height Modernization Network



RTN Concept

Started with a clean sheet of paper

Determined an optimal spacing would be under 100KM

Required redundancy in case up to 5 non-adjacent stations are inoperative

Requirement to be operational during and after a post hurricane event

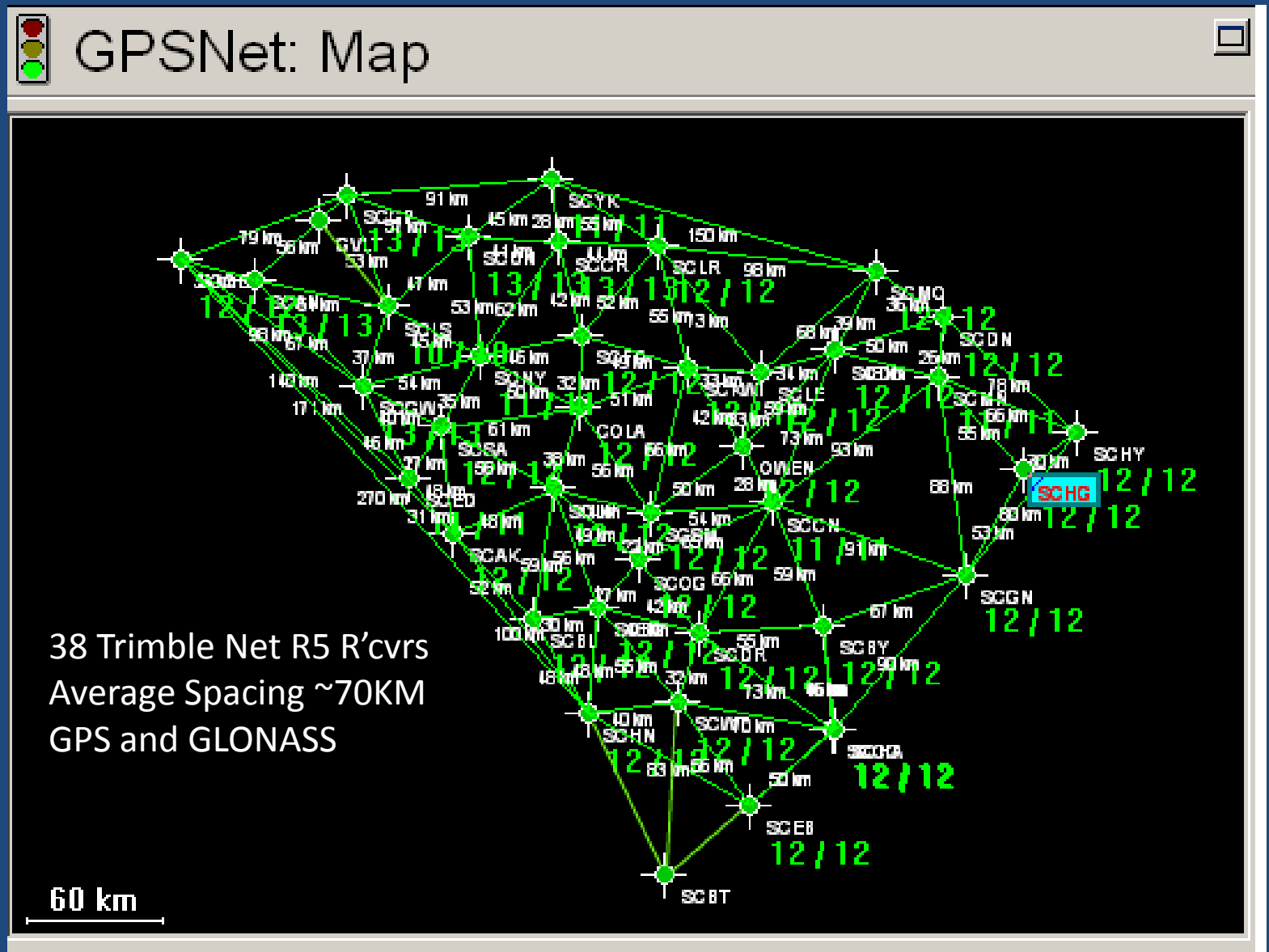
31 stations will marginally cover the state, we operate 38 and eventually 45

Future activities include sharing RTN stations with NC

IT involvement would be critical to our success

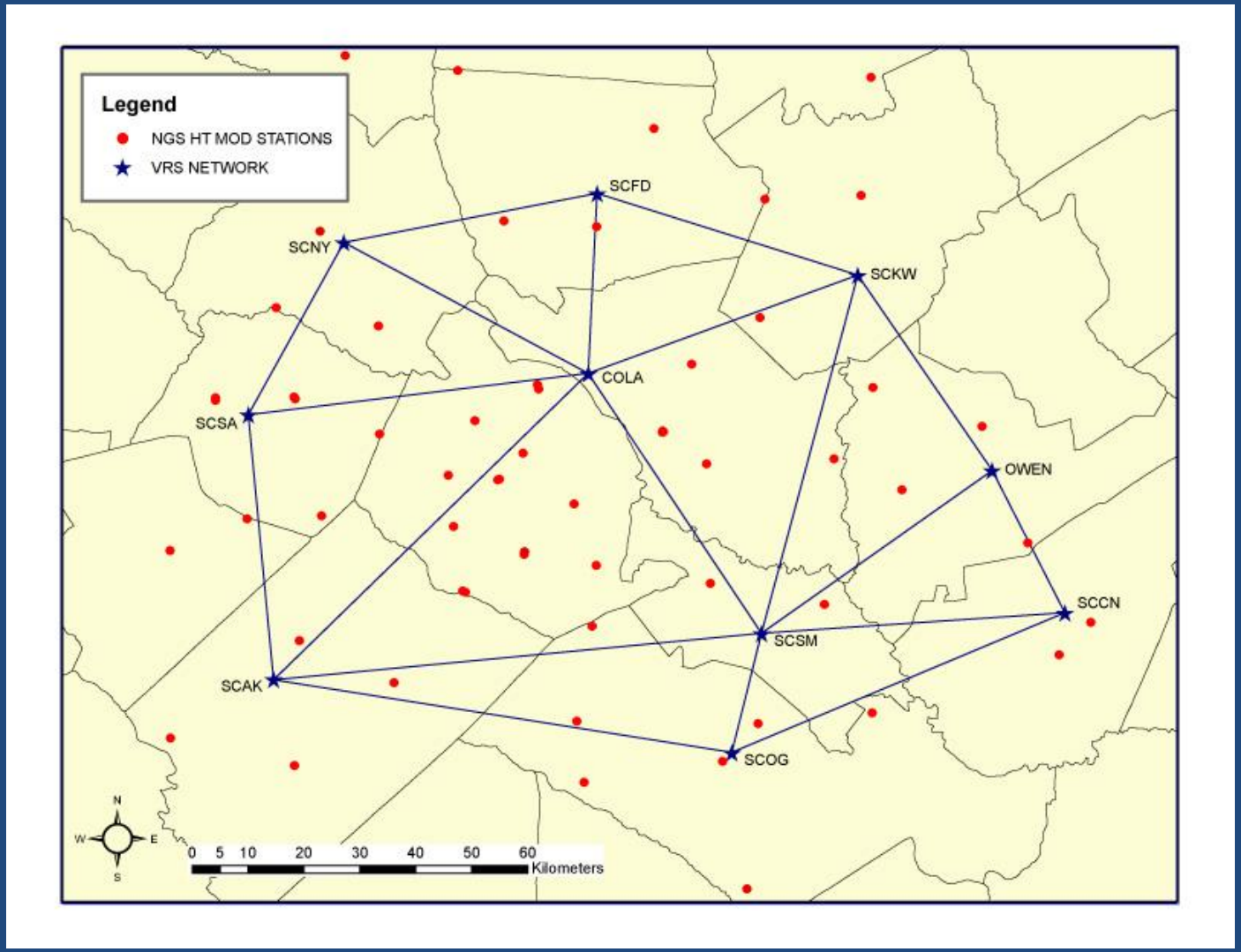
RTN design accuracy was 2.4cm horizontal, 3.1cm vertical 95% of the time.

SC Real Time Network



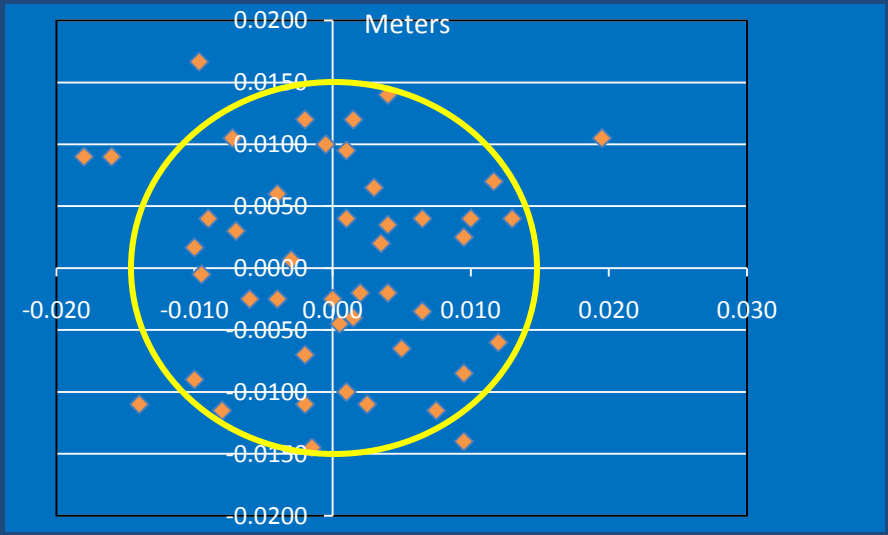
Test Network

11 Counties, 6700 Sq Mi, 10 VRS Base Stations, 50 NGS Ht Mod Control Pts



VRS Absolute Accuracy

Comparison of VRS and NGS Height Mod Control
Absolute Accuracy



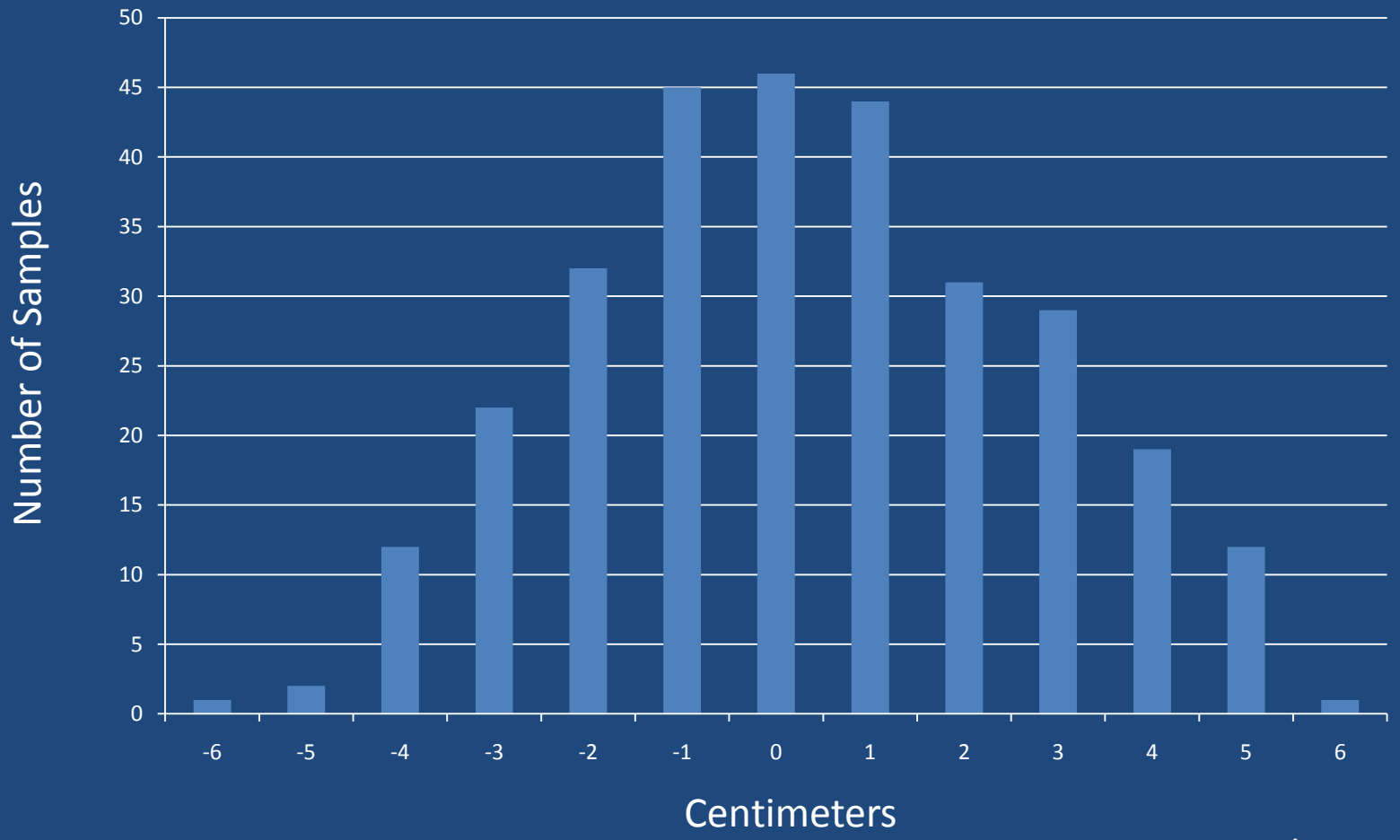
Time (sec)	300	60	5
Horizontal (cm)	1.98	2.40	2.41
Vertical (cm)	2.25	2.39	2.40

Allowable 2-D $RMSE_r$ 95% = 1.7308 * $RMSE_r$ =
$(2.0*2.0 + 0.3*0.3 + 1.2*1.2)^{1/2}$ = 2.4 cm*

Allowable 1-D $RMSE_v$ 95% = 1.9600 * $RMSE_v$ =
$(2.0*2.0 + 0.3*0.3 + 2.4*2.4)^{1/2}$ = 3.1 cm*

*$(\text{Local Accuracy}^2 + \text{Eccentricty}^2 + \text{System Design}^2)^{1/2}$

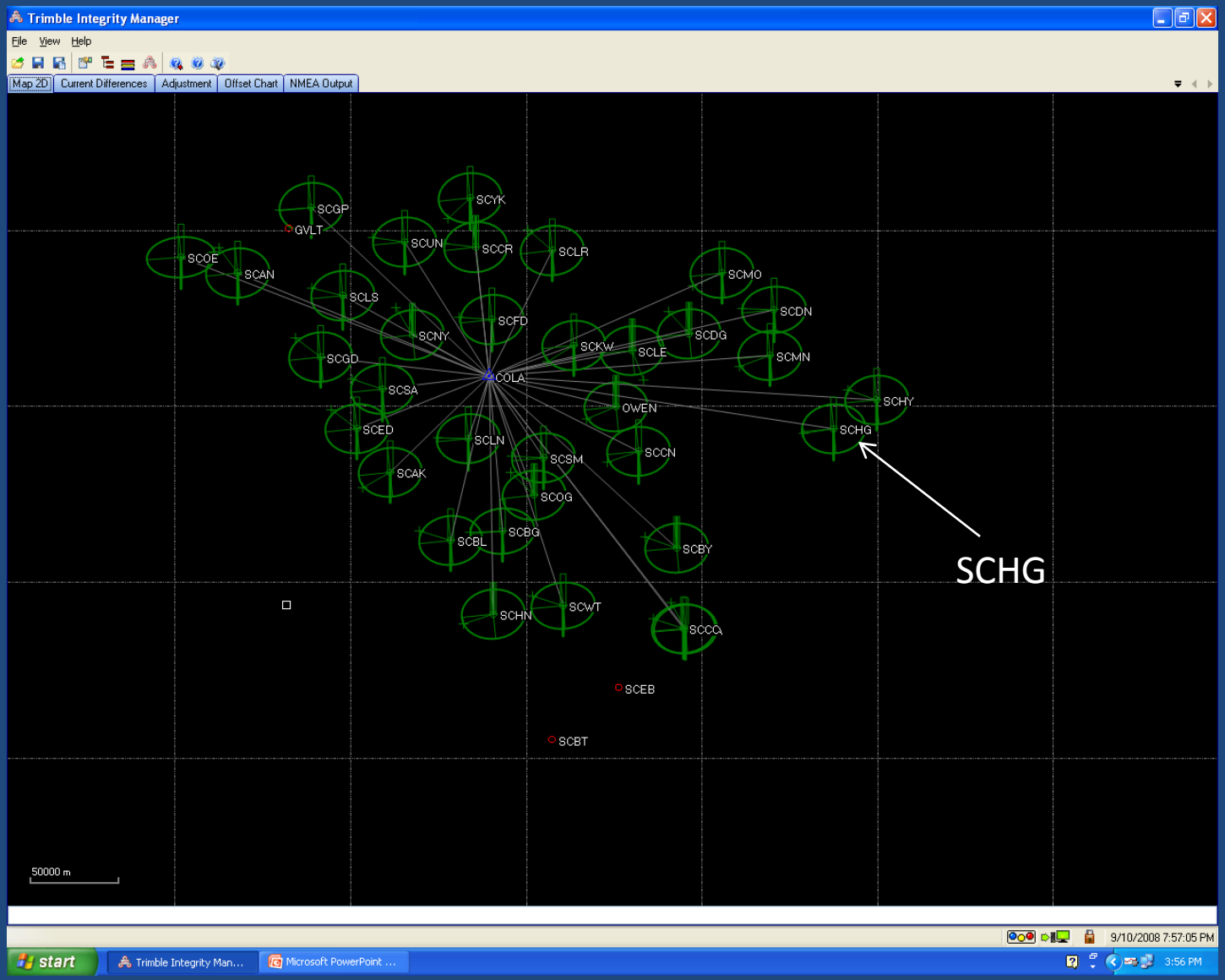
Difference Between Published and VRS Elevations



Sample = 298
Mean = 3mm
StdDev = 25mm
60 second observation period

67% < +/-25mm
84% < +/-35mm
96% < +/-50mm

Integrity Monitor – Network Motion



Network Motion 9/3 – 9/10/08